A POTENTIAL MARKET STUDY OF A DOMESTIC RECORD / DATA COMMUNICATIONS SERVICE

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A POTENTIAL MARKET STUDY OF A DOMESTIC RECORD/DATA COMMUNICATIONS SERVICE

Prepared For:

ITT WORLD COMMUNICATIONS, INC.

MARCH 1980

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A POTENTIAL MARKET STUDY
OF A
DOMESTIC RECORD/DATA COMMUNICATIONS SERVICE

ABSTRACT

Closed user message networks are multistation teleprinter networks with the majority of the traffic being between locations of the same company. Such networks implemented on the Telex/TWX network are the primary focus of this study. An estimated 12,000 stations of the total Telex/TWX population of 130,000 stations, are connected to closed user networks. The traffic volume among these stations is about 19 minutes per station per day, or about 75% higher than the 11 minutes per station per day which is the average for all stations on Telex/TWX. About 85% of the closed user network stations are located within the largest 100 metropolitan areas. This percentage is slightly higher than that of the Telex/TWX population. The primary alternative method of implementing these closed user networks is the telephone network using WATS tariffs and user owned control equipment such as message switchers. The most critical user requirement in implementing any closed user network is network reliability in a broad sense.

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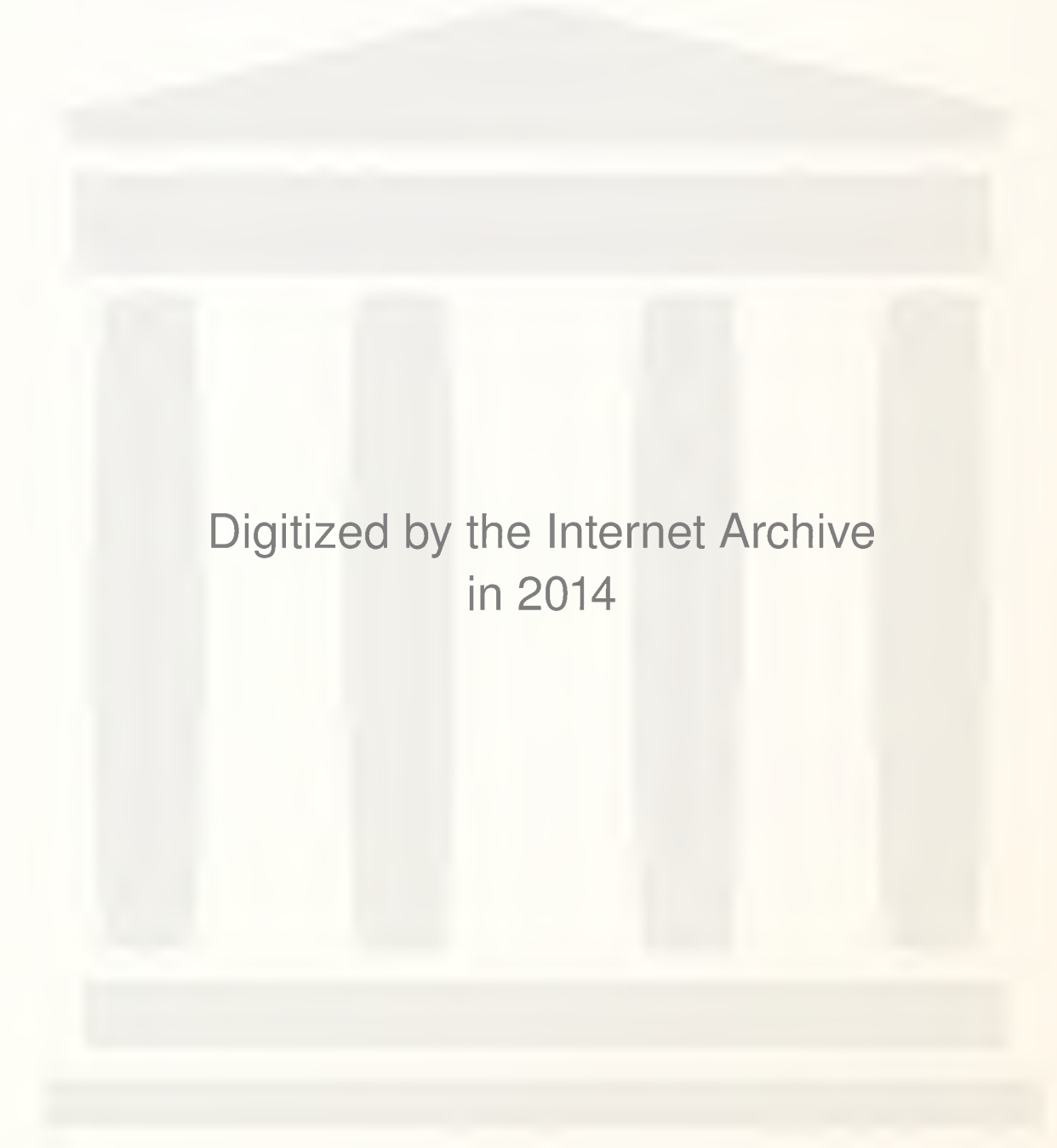
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1 INTRODUCTION

I INTRODUCTION

A. OBJECTIVES

- It is the intent of this study to examine and define the market for a domestic record/data service being considered by ITT World Communications, Inc., within the United States. To this end, four specific objectives were established for the study:

  - To define and quantify the market for closed user network implemented on Telex/TWX. A closed user network is defined as a single company, multi-station network in which at least 75% of the traffic remains within the network.

  - To evaluate the primary alternative network solutions which are available to the users of closed networks. The principal factor to be evaluated is price, but other factors are also to be considered.

  - To evaluate the potential market acceptance which a new message network service would achieve among these users of closed networks.

  - To define the service requirements imposed by closed user networks with particular emphasis on the areas of:

    . Geographic coverage.

- Traffic volumes.
- Sensitivity to price.
- Equipment connection requirements.
- Other message service interconnection requirements.

- It is necessary to establish the position of closed user networks in relationship to the other segments of the Telex/TWX marketplace with respect to both the relative sizes of these segments and the differing requirements of the closed user networks.

- To the extent possible, the interviews were to be conducted to give a representative geographic sample of the Telex/TWX population.

B. RESEARCH METHODOLOGY

- Four separate tasks were established to accomplish these objectives:

- Task I: In-depth interviews.

  - A total of sixty on-site interviews were conducted with communication managers of Telex/TWX networks.

  - Fifty of these interviews were with current users. The other ten were with companies which had been users, but have recently discontinued their use of Telex/TWX in favor of another type of network solution.

  - These sixty interviews were conducted along the East Coast from Boston to Philadelphia, in Chicago and in San Francisco.

- The primary objectives addressed by the Task I interviews were:

  . Definition of user requirements.

  . Evaluation of new service acceptance.

- Task II: Sample survey of Telex/TWX population.

  - 201 telephone interviews were conducted with the Telex or TWX supervisors of a randomly selected sample of the Telex/TWX population.

  - The primary objectives addressed by the Task II interviews were:

    . The segmentation and sizing of the Telex/TWX population.

    . A definition of the traffic volume's requirements.

- Task III: Price analysis of alternative network services.

  - A hypothetical but representative network was defined and eight parametric variations were established, bracketing the common ranges of sizes and volumes for most closed user networks.

  - Each of six alternative network services were priced for the hypothetical network and its eight variations.

  - The six services compared were:

    . TWX.

    . DDD.

    . WATS.

. On-Tyme.

. InfoCom.

. Private wire system.

- The primary objective addressed by the Task III analysis was:

. An evaluation of competitive price levels and structures.

- Task IV: An analysis of market distribution by geography.

- A sample of 100 companies with multi-station networks were selected at random from a larger sample of 331 such companies identified from the 1979 Telex/TWX directory.

- The station locations of these 100 company networks were identified first by city and then by Standard Metropolitan Statistical Areas.

- Eighteen of these 100 companies are also included in the fifty companies interviewed on-site, giving a cross check on the results.

- The primary objective addressed by the Task IV analysis was the definition of geographic distribution requirements.

- At the completion of these four basic tasks, the results were analyzed and compared against the plans proposed by ITT for the domestic record/data service. Conclusions were reached regarding the plans' market feasibility and regarding some specific features and capabilities to be offered as a part of the service.

- Finally, a set of recommendations was developed for consideration by ITT in furthering and, in some cases, modifying the plans for the domestic record/data service.

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II EXECUTIVE SUMMARY

II EXECUTIVE SUMMARY

A. KEY CONCLUSIONS

- A 12,000 station market exists in closed user networks implemented on Telex/TWX.

- This market is relatively available at present for a DR/DS type of service, but its availability will decline over the next few years due to its constituent companies finding other solutions.

- While the closed user network market is large enough and available enough for short-term, rapid growth, it is too small for longer term growth of the DR/DS.

- Larger and longer-term growth opportunities exist both within the Telex/TWX population as international access stations and also in other related message services.

- The traffic volumes within the closed user networks average about 19 minutes, or 5,000 characters per day.

- Closed user networks require service to substantially all of their network locations.

- This geographic requirement can be translated into a requirement to provide convenient and economical service access to approximately 100 metropolitan areas. A metropolitan area, for this purpose, is considered to be the city limits plus 20 miles. This extended area is particularly important for the large metropolitan areas such as New York, Chicago, and Los Angeles.

- Network reliability (meaning network availability, probability of connection, station uptime, failure restoral times, and many other factors) is the most important consideration in introducing a new service.

  - The unreliability of the Telex/TWX network is the most frequently stated reason for dissatisfaction.

  - Network reliability is the most important reason for considering conversion to another service.

- Alternative solutions exist and are being considered by many existing multi-station network users now on Telex/TWX.

- Future alternative solutions announced, such as Bell's ACS, tend to be more oriented to the data network market than to the message network applications.

B. CONCLUSIONS

1. MARKETS

- The Telex/TWX network connects a total of almost 130,000 stations.

- Of these, approximately 70,000 are unavailable to the DR/DS due to being used as:

- Access stations to other companies (40,000).

- Supplementary stations on another network (24,000).

- Non-chargeable stations (5,000).

- Of the remaining 60,000, the primary market being addressed (that of closed user networks) consists of a total of 12,000 stations.

- There is a secondary market addressable by DR/DS of almost 50,000 stations consisting of:

  - International access stations (46,000).

  - InfoCom networks (3,000).

- In addition to the potential markets for DR/DS, which are a part of Telex/TWX, there are additional message application markets, such as private wire systems and others, which could be available for DR/DS marketing. Many of these markets consist of networks which were once implemented on Telex/TWX. These tertiary markets include:

  - Small private wire systems (20,000).

  - Telephone based message systems (50,000).

  - USPS access stations (5,000).

  - Industry systems; e.g., DR (25,000).

2. TRAFFIC VOLUMES

- The average traffic volume per station of the entire Telex/TWX 130,000 station network is approximately 11 minutes per day.

- 7.5 minutes of this average are domestic usage. The other 3.5 minutes are international access outbound.

- Telex usage, in minutes per day, is slightly higher than TWX.

- This traffic volume is made up of a message volume of eight messages per day at 400 characters per message, and an average transmission rate of 300 characters per minute.

- There are wide variations between the individual stations, but relatively little variation between large groups or segments of the Telex/TWX population.

- In the case of closed user networks, most of the stations which comprise these networks match the overall population averages for traffic volumes.

  - However, these closed user networks differ from the overall population in one important respect and that is the existence of a central station (or two or three). This central station is the receiving location for almost all network traffic originated at the other stations, and it transmits traffic back to the outstations at a volume approximately 75% of the volume received.

  - Thus, the average traffic volume for closed user networks is about 1.75 times the population average, or 19 minutes per station.

- While most of the traffic in a closed user network remains within the network (this is in fact the definition of a closed user network), it is important to note that there is usually some volume of off-net traffic which must be transmitted.

  - This off-net traffic averages about 5% of the total (again with wide variations).

- The destinations of this off-net or refile traffic are other message services such as:

  . International messages.

  . Mailgrams.

  . Other companies' Telex/TWX stations.

3. GEOGRAPHY

- One of the most important requirements which closed user networks impose on a network service is service availability in all or substantially all of the user locations.

  - While users will make adjustments for low volume stations, one of their first selection criteria of a new service is the number of user locations served.

- Service availability in a message environment does not have the same level of "immediacy" as in a data or voice environment. If a message can be transmitted in less than an hour, without inconveniencing the user either in effort or cost, the service will be regarded as satisfactory. This opens many solution possibilities for providing service availability to remote and even low volume locations.

- Approximately 24% of the stations on large (11 or more) multi-station networks are located within the top 25 cities (ranked by population).

  - Forty percent of the stations are within the top 100 cities.

- If cities are defined as SMSAs (Standard Metropolitan Statistical Areas, or Standard Consolidated Statistical Areas in the case of the very large cities), the percentage of stations located within those geographic centers increases dramatically.

  - Largest 25 metropolitan areas - 50% of stations.

  - Largest 100 metropolitan areas - 73% of stations.

- Examining the large closed user networks, the percentage of stations within the largest 100 metropolitan areas is even higher - about 85%.

- Based on an estimate that closed network users will give serious consideration to a new service only if at least 80% of its locations are served, the conclusion is reached that a new message service must be made available in approximately 100 cities.

4. VALUE ADDED FEATURES

- Value added features are not an important reason for closed network users to convert from their existing Telex/TWX network to another service.

- Such users are interested in, and willing to use and pay for, many value added features.

- Abbreviated dialing is regarded as the most useful value added feature discussed.

  - This level of importance has powerful implications for the ways in which service availability is provided to remote locations.

- On the other hand, mailbox delivery is regarded as the least useful.

  - This has very similar implications for remote access methods.

5. TERMINALS

- Terminals are regarded by users as an integral part of their networks. While most of them are willing to obtain these terminals from third parties (and many already do), they still consider a terminal failure to be a network failure, and slow maintenance response to be a factor of which the service supplier should be aware and over which it should have some control.

- Users also have definite ideas on needed terminal improvements, primarily in the areas of:

  - Editing capabilities.

  - Buffering capabilities.

  - Office environment acceptability (noise and appearance).

- If terminals are not provided by the service vendor, and most users do not require that they be, some guidance in their selection and some assistance in the control of their maintenance is expected of the service vendor.

6. NETWORK RELIABILITY

- As previously noted, network reliability is the most important consideration to the user in converting to any new service, and some means must be found to demonstrate the higher reliability of the new service.

- Network reliability means many things, simultaneously, to the network users. It means:

  - Availability of the basic network services to all stations.

  - Ability of any connection to be established in a reasonable time period.

- Operability of the terminal and its connection to the network (these two are largely undifferentiable by the operators).

- Rapid response and restoral times to any perceived failures, especially at the stations.

- Awareness of, and effective action on, any long time outage or persistent problem. This action is required of the basic service provider regardless of the source of the problem.

- On the other hand, network users are aware that failures do occur and accept some level of network outages.

- In addition, message system users do have other alternatives (e.g., voice telephone) as temporary fallback in case of failure.

7. COMPETITIVE ALTERNATIVES

- Because of the centralized nature of the closed user networks and their many-to-one traffic patterns, a significant amount of control of the network is usually performed at the central station.

  - This control may be manual or automated (e.g., some form of message switcher).

  - The larger the network, the higher the requirement for such control.

- The competitive alternatives fall into two categories:

  - Those with built-in central control capabilities.

    . On-Tyme from Tymnet.

    . InfoCom from Western Union.

. Wilcom from Wiltek.

- Those without central control capabilities.

. Telex/TWX.

. Telephone network based systems (DDD or WATS).

. Dedicated line networks.

- WATS based networks are usually the lowest cost networks.

- On-Tyme is a very cost effective controlled network alternative, but it has very little off-net capability at present.

- Dedicated line networks only become cost effective in very large systems (100 or more stations) or in restricted geography networks.

C. RECOMMENDATIONS

- The availability market for a domestic record/data service is of adequate size, relative to ITT's plans, to justify proceeding with the implementation of the service.

- Develop the primary market, that of closed user networks currently implemented on Telex/TWX, rapidly, taking advantage of a time window of user dissatisfaction. This current situation of user dissatisfaction will disappear in a few years as those users continue to find other solutions, as many previous users already have done.

- Prepare plans to define and develop the secondary and tertiary markets.

- The primary market, though capable of rapid market development, is too small to support the future growth of DR/DS.

- The network developed for the primary market is ideally suited to address:

  . The secondary market, that of other Telex/TWX stations used for international access and for InfoCom.

  . The tertiary market, that of other message networks, many previously implemented on Telex/TWX.

- Establish an experienced communications system sales force.

  - A limited number (perhaps 12 or less) of well-qualified and well-supported sales people could be much more effective in this primary market environment than a larger number of less qualified persons.

- Identify and qualify the customers who comprise the primary market.

  - The large closed user network market of 5,000 stations consists of about 125 users.

  - The small closed user network market of 7,000 stations consists of possibly 1,500 users.

  - The larger users are more dissatisfied than the smaller users and should be addressed first.

- Involve the prospective users in the planning of the DR/DS as soon as practicable.

  - The present situation represents a unique opportunity to allow customers to contribute to the detailed service specifications while

some details are still flexible, and, at the same time to commit themselves to becoming the initial revenue customers.

- The two dangers of such an approach are:

  . User demands for unprofitable features. This will require some good negotiators to be on the ITT team.

  . Possible cancellation of the entire project after user involvement. Users should not be involved until the DR/DS project has gotten to a point of high probability of completion.

- Provide service as conveniently and economically as possible to 100 or more locations.

  - Convenience implies that the operator, after preparing the message to be sent, can initiate transmission with minimal manual intervention. Specifically:

    . No 10 or even 7 digit dialing.

    . No call progress tone monitoring.

    . No manually controlled answerback exchanges.

    . No repeat dialing on busies.

  - Economical means that:

    . For at least 25% of the stations (65% of the traffic volume), there is no user premium for a call.

. For at least 80% of the stations (95% of the intracompany traffic volume), the maximum premium is local message units (approximately 10¢ per call).

. For all of the stations and all of the traffic volume, the user premium is a maximum of 30¢ per call.

- The following solution strategy is proposed, not as the necessarily appropriate solution, but rather as a further explanation of the requirements:

  - Dedicated line connections to all subscribers within the city limits of the 25 largest cities, and to central stations of user networks regardless of location.

  - FX lines to 75 additional cities as well as to approximately 100 suburbs locations around the 25 largest cities.

  - In WATS lines for all other stations.

  - A station controller at each telephone connected station which would do:

    . Automatic dialing.

    . Automatic redialing.

    . Connection control.

- Implement network reliability-enhancing techniques in order to provide assurances to prospective users that DR/DS would be a much more reliable network than Telex/TWX.

  - These network reliability-enhancing techniques could include:

. Diagnostic checks to all stations in off hours.

. Centralized control of network operations and of maintenance functions, even those of third party terminal vendors.

. Customer network managers designated and named to the customers for customer service.

- Establish close relationships with terminal providers in order to accomplish two critical customer service functions:

  - Availability of an appropriate array of network compatible terminals.

  - Common and acceptable levels of maintenance quality and of control of maintenance reporting, dispatching, and follow-up.

- Provide adequate interface capability with the DR/DS system so that a reasonable range of customer equipment and systems can be connected to the network.

- Provide a capability to refile messages out of the DR/DS network to other message services, particularly:

  - International Telex.

  - Telex/TWX stations of other companies.

  - Mailgram.

III NETWORK USER ANALYSIS

III NETWORK USER ANALYSIS

A. MARKETS

1. TELEX/TWX MARKET SEGMENTATION

- At the end of 1978, there were 121,300 Telex/TWX stations in service.

  - Of these, 54,000 were TWX and 67,000 were Telex.

- Telex/TWX has been growing at a 5% AAGR, which would put the total number of stations as of mid February 1980, at about 128,000 (or nominally 130,000).

- Based on the telephone survey of 201 Telex/TWX stations taken at random and extrapolating this sample to the entire Telex/TWX population, the market was segmented into the categories and sizes shown in Exhibit III-1.

- Intra-company stations were defined as those stations with 75% or more of their traffic remaining within the network. All others were considered to be outside access stations.

  - It is interesting to note that the users studied, both in the telephone survey as well as the on-site survey, fell neatly into two groups:

    . Mostly intracompany traffic.

EXHIBIT III-1

TELEX/TWX MARKET SEGMENTATION

Total number of stations	130,000		
Outside access stations	86,000		
Single stations		63,000	
Domestic access			29,000
International access			34,000
Two to ten stations		17,000	
Domestic access			8,000
International access			9,000
Eleven or more stations		6,000	
Intra company stations	36,000		
Two to ten stations networks		21,000	
Supplementary stations			14,000
Closed networks (NOTE 1)			7,000
Eleven or more station networks		15,000	
Supplementary stations			10,000
Closed networks			5,000
Miscellaneous stations	8,000		
Info Com		3,000	
Non-chargeable		5,000	

NOTE 1: Supplementary/closed split was not tested but was assumed to be the same as larger networks.

. Mostly extracompany traffic.

- This bi-model distribution can be observed in Exhibit III-2.

- Outside access stations were further divided into domestic access or international access. As shown in Exhibit A-1, a sizeable percentage of stations have more than 80% of their traffic intended for overseas stations.

- Intra-company stations were divided into supplementary stations and closed networks. A supplementary station is located at a very remote or low volume location on a network in which the user has another primary message system. The data to perform this split were derived from the on-site interviews and can be seen in Exhibit A-3.

- Finally, the non-listed stations, specifically those used for InfoCom Class 3 and 4, and other non-chargeable stations were subtracted from the total count of 130,000 stations.

2. MARKET POTENTIAL FOR DOMESTIC RECORD/DATA SERVICE

- This market potential is shown in Exhibit III-3.

- The primary market which represents a potential for DR/DS is that of closed user networks implemented on Telex/TWX.

  - These data were derived from Exhibit III-1.

  - The total size of this primary market is 12,000 stations.

- The secondary market consists of other available segments of the Telex/TWX population. These were considered to be:

  - The international access stations.

EXHIBIT III-2

PERCENTAGE OF MESSAGE TRAFFIC WITHIN THE COMPANY

PERCENT	TELEPHONE SURVEY		ON-SITE SURVEY	
	NUMBER OF COMPANIES	PERCENT OF COMPANIES	NUMBER OF COMPANIES	PERCENT OF COMPANIES
95-100%	21	10.4%	16	27%
85-95	31	15.4	1	2
75-85	6	3.0	3	5
65-75	8	4.0	2	3
55-65	4	2.0	0	0
45-55	18	9.0	2	3
35-45	2	1.0	1	2
25-35	1	0.5	2	3
15-25	9	4.5	5	8
5-15	9	4.5	8	13
0-5	92	45.8	20	33
TOTAL	201	100.0%	60	100%

EXHIBIT III-3
MARKET POTENTIAL FOR DOMESTIC RECORD/DATA SERVICE

	NUMBER OF STATIONS
• Primary Market	
- Closed user networks implemented on Telex/TWX	
. Large users (11 or more stations)	5,000
. Small users (2 to 10 stations)	7,000
TOTAL	12,000
• Secondary Markets	
- International access	46,000
- InfoCom	3,000
TOTAL	49,000
• Tertiary Markets	
- Small private wire systems	20,000
- Telephone based message systems	50,000
- USPS access	5,000
- Industry systems (e.g. RR)	25,000
TOTAL	100,000

- The InfoCom stations.

- Domestic access and supplementary stations are regarded by INPUT as unavailable to DR/DS because of a lack of competitive advantages relative to their existing network.

- The tertiary market consists of other message system markets which are now in place and are likely to be available to DR/DS.

  - Many of these markets are made up of networks which were once implemented on Telex/TWX but have already moved to these other alternatives.

  - Small private wire systems are those under 100 station networks. Larger networks are regarded as unavailable.

  - Telephone based message systems are similar to small private wire systems in that most were at one time a Telex or a TWX network.

  - USPS access are those stations which are installed primarily for access to the Mailgram service. The 3,000 Western Union Electronic Mail, Inc., terminals constitute the bulk of these stations.

  - The special industry networks are often private wire systems but increasingly telephone connected. They include networks which interconnect railroads, motel reservation systems, etc.

- The tertiary market, while sizeable, is difficult to quantify and to identify. The numbers used are INPUT estimates of the respective segments.

- Not included in the DR/DS market potential were two additional classes of message market segments:

  - Specialty segments such as facsimile.

- Future segments such as communicating word processor networks or electronic mail.

3. LARGE CLOSED USER NETWORKS

- The segment of the primary market designated "large closed user networks" is considered to be of prime and urgent importance to the market development of DR/DS.

- This 5,000 station segment is immediately addressable:

  - Twenty-five percent of the companies are dissatisfied with Telex/TWX and also are considering making a network change.

  - These 25% are the largest companies and represent 50% of the stations.

- There are only 125 companies which make up this urgent segment and they are all listed in the Telex/TWX directory.

- The closed user networks tend to be even more centrally located than other multi-station networks. Eighty-five percent of the closed user networks are located in the largest 100 metropolitan areas, whereas for all multi-station networks the number was 73%.

B. TRAFFIC VOLUMES

1. TELEX/TWX NETWORK TRAFFIC

- In 1978, Western Union obtained $143 million in usage revenue from the 117,500 Telex/TWX stations in service as of mid 1978.

- This equates to $1,217 per station, or $101 per month, or $4.61 per working day.

- Dividing this figure by the known average of about 45¢ per minute, an average daily traffic of just over 10 minutes can be derived.

- This correlates well with FCC reported data indicating an average daily traffic of 7.5 minutes domestic and 3.5 minutes international on Telex and slightly less on TWX.

- This also correlates well with the data from the telephone interviews and the on-site interviews of this study which indicate an average traffic volume of about 11 minutes.

- The methodology used in the traffic volume portion of the two surveys was designed to detect differences in traffic volumes between various segments of the Telex/TWX markets, not to define traffic volumes directly.

  - In a number of interviews there is sufficient information to develop actual traffic volumes. It is these interviews which correlate well with system averages.

- The surveys, primarily the telephone survey, show no significant difference in traffic volumes between groups of stations representing the various segments of the marketplace.

- The two primary items of data collected are messages per day and lines per message.

- In all segments, these average:

  - 8 messages per day.

  - 14 lines per message.

- The variation is wide between individual stations and networks.

  - The estimated number of messages per day ranges from 0.2 to 100.

  - The estimated number of lines per message ranges from 3 to 45.

- From other data and a limited number of samples, it is estimated that the average line length is 30 characters and the average transmission rate is 300 characters per minute. This data can then be reduced to:

  - 3,300 characters per day per station.

  - 11 minutes transmission time per day per station.

2. CLOSED USER NETWORK TRAFFIC

- The stations on closed user networks generate the same volume of traffic as all other types of stations, that is, 11 minutes per day.

- There is, however, one significant difference in closed user networks and that is the traffic pattern.

- Effectively all of the traffic originated at an out station in a closed user network is destined for one or very few central locations.

  - Usually these central locations are headquarters, or an order department, or the main plant, etc.

- All of the traffic sent to these central locations generates additional traffic back to the outstations.

  - Order confirmations, shipping dates, policy verifications, etc.

- The volume of this traffic from the central stations back to the outstations is approximately 75% of the volume of incoming traffic to the central station.

- Although there are relatively few of these central stations on the Telex/TWX network (one per closed user network), the high volumes which they generate bring the average traffic volume for all closed user network stations up to 19 minutes per day.

C. GEOGRAPHIC REQUIREMENTS

1. AVAILABILITY CONSIDERATIONS

- Closed user networks exist in order to provide some reasonably well defined communication applications to the remote locations of the user company.

  - These applications must be provided in some way to all user locations regardless of remoteness or other considerations.

  - Users with substantial numbers of remote outstations, or even a few, are intimately familiar with the problems of providing service to such locations.

  - The ability of a message service to provide the application capability to all stations is one of the key measures of its potential acceptability.

- Message services are somewhat unique among communications services in the requirements imposed by the user applications.

  - Urgency is much less of a consideration. Message delivery times in the one hour range are highly acceptable in most cases. Immediate interactive connection is rarely necessary from an application point of view.

- Operator ease of use and system economics are much more important considerations then urgency.

- The combination of the above two points open many possible solutions for remote locations. Usually these solutions will encompass some combinations of:

  - Dial up telephone connections.

  - Local buffering of outgoing messages at the station.

  - Storage and forwarding of messages through the network.

2. METROPOLITAN AREA COVERAGE

- By examination of the Telex/TWX directory, 331 companies with 10 or more stations were identified. These companies are listed by SIC code in Appendix D.

- Of these, 100 companies were selected at random and their geographic locations examined in detail.

  - Eighteen of these companies were among the sixty companies interviewed on-site.

  - These companies are listed in Exhibit C-3.

- From the 3,649 locations operated by those 100 companies, a distribution was made within the top 100 metropolitan areas.

  - A first estimate was made within the cities.

  - A second estimate was made within the metropolitan area.

- The summary of the results of these two estimates is shown in Exhibit III-4.

- A listing was prepared of the metropolitan areas in population sequence, allowing for standard consolidated areas in the largest cities. This listing is shown in Exhibit C-1.

- The distribution of stations for the 100 company sample was made for that set of metropolitan areas. This distribution is shown in Exhibit C-2.

3. SUBURBAN COVERAGE

- There is a significant difference between providing service to the city and providing service to the metropolitan area in terms of number of stations served of multi-station networks. This difference is more than a factor of two among the largest cities as shown in Exhibit III-4.

- The suburbs of large cities are defined by the Standard Metropolitan Statistical Areas for purposes of this study. In the very largest cities there is a higher level, that of Standard Consolidated Statistical Areas, which for New York, for example, includes other SMSAs such as Newark, Paterson, etc.

- In order to provide the coverage needed for closed user networks, these suburbs need to be served economically and conveniently.

  - In New York, this probably means providing service to about eight suburban locations.

  - In Denver, this probably means providing service to two suburban locations.

EXHIBIT III-4

GEOGRAPHIC DISTRIBUTION OF TELEX/TWX TERMINALS

METROPOLITAN AREAS	PERCENTAGE OF LARGE NETWORK STATIONS	
	INCLUDING SUBURBS	NOT INCLUDING SUBURBS
LARGEST 25	50%	24%
LARGEST 100	73%	40%(est)

D. VALUE ADDED SERVICES

1. SURVEY RESULTS

- Multi-station network users interviewed on-site were presented with twelve possible value added features and asked to rate them in terms of "very useful", "useful," or "not useful."

  - Rating these responses 2, 1, and 0, respectively, the composite scores are shown in Exhibit III-5.

- Abbreviated dialing was the most useful feature, indicating a need for operator ease and convenience, a consideration which appears frequently in this report.

- Users were also asked to evaluate the additional price they would be willing to pay for these features, if any.

  - In most cases they would be willing to pay more.

  - On average, the increment is about 8%.

  - Many users would prefer that the cost of the value added features be built into the cost of the basic service.

- Users also indicated that while they would be interested in value added features and, in general, would be willing to pay for them, such features are not an important reason to convert to a new service.

2. INTERPRETATION OF USER REQUIREMENTS

- While there was good overall interest in all of the value added features, some, such as mailbox delivery and station polling, were lower than the others.

EXHIBIT III-5

VALUE ADDED FEATURES

CONSIDERED USEFUL BY RESPONDENTS

FEATURE	COMPOSITE RATING
Abbreviated dialing	93
Camp-on	67
Multiple address	71
Group codes	63
Station polling	51
Mailbox delivery	44
Automatic service upgrade	65
High speed interface	71
Other service interface	72
T&C call billing	73
Departmental billing	61
Message formating	65

- Rating system.
  - Very useful 2*
  - Useful 1*
  - Not useful 0*

* Times 60 respondents = 0 to 120.

- Much of this difference can be attributed to a lack of any such features on the market today, and therefore a lack of understanding of their potential utility on the part of the respondents.

- The more understandable and/or the more currently available features drew the highest ratings.

E. TERMINALS

1. AVAILABILITY

- To a user, whether of multiple stations or a single station, the terminal is not only an integral part of the functional capability of the service, but it is also the most visible part.

- A separation of the availability of the service from that of the terminal, while conceptually acceptable to users, and in fact implemented by quite a few users, requires a level of system sophistication and self confidence which relatively few smaller users possess.

- If, as planned, ITT does not offer terminals, this will be acceptable to users only if they can be assured that appropriate terminals are truly available and if they are aided in their selection of terminals and terminal vendors by the service provider.

- In addition, the users will be looking to the service provider for assistance in the management of terminal maintenance situations.

2. FEATURES

- Most existing Telex/TWX users have a familiarity with teletype terminals.

- Relative to their experience with these units, users are looking for:
  - Better buffering capability.
  - Better editing capability.
  - CRT displays.
  - More quiet, improved appearance devices.

F. NETWORK RELIABILITY

1. DISSATISFACTION WITH TELEX/TWX

- A large number of multi-station users of all types expressed great dissatisfaction with their Telex/TWX operations, particularly with respect to network reliability issues.
- This dissatisfaction was expressed in three ways:
  - Direct question.
    - . Satisfied, 63%.
    - . Dissatisfied, 37%.
  - Level of Satisfaction - Scale of 0 (dissatisfied) to 12 - 5.6 average.
  - Planning to change - 28%.

2. INCENTIVE TO CONSIDER NEW MESSAGE SERVICE

- Practically all users would consider any new message service.

- Many, particularly the ones who are either dissatisfied with Telex/TWX, or planning to change, or both (these total about 50% of the respondents), would consider a new service very seriously.

- The factors which would be of importance to multi-station users in converting to a new service are as follows (scale is 0 to 3, unimportant to very, very important):

-	Network availability	1.9
-	Geographic coverage	1.7
-	Ease of use	1.7
-	Price	1.6
-	Value added features	1.3
-	Network management	1.2

3. INTERPRETATION OF USER REQUIREMENTS

- While the number of dissatisfied users does not appear high, nor does the level of dissatisfaction, it often turned out in the interviews that the users expressing satisfaction with Telex/TWX early in the interviews gave it lower grades on specific considerations later in the interviews.

- In addition, the comments made to the interviewer indicate a distinct pattern of decline in the levels of satisfaction.

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- The long standing process of network users converting to other types of network services continues and very likely is accelerating.

IV EVALUATION OF COMPETITIVE ALTERNATIVES

IV EVALUATION OF COMPETITIVE ALTERNATIVES

A. PRICING ANALYSIS

1. STRUCTURE OF THE PRICING MODEL

- The most objective comparison between alternative network communications services is a pricing analysis.

- In this study, a model network was defined with locations, traffic volumes, and patterns, etc.

  - Key parameters of the model network, such as number of stations, transmission speed, traffic volume, etc., were varied to bracket the likely ranges of networks to be addressed by the DR/DS.

  - The basic model and eight such variations were then priced for each of six different existing alternative services.

- The basic model network definition is as follows:

  - Fifteen major cities:

    . New York City.

    . Chicago.

. Los Angeles.

. Philadelphia.

. Detroit.

. San Francisco.

. Washington, DC.

. Boston.

. St. Louis.

. Pittsburgh.

. Houston.

. Minneapolis.

. Cleveland.

. Atlanta.

. Denver.

- Ten secondary cities:

. Akron.

. Hartford.

. Raleigh.

- . Jacksonville.
- . Nashville.
- . Oklahoma City.
- . Phoenix.
- . Spokane.
- . Stockton.
- . San Diego.

- Traffic volumes.
  - . Five messages per day per station.
  - . Three hundred characters per message.
- Other definitions.
  - . 110 bits per second unless otherwise noted.
  - . All traffic went to New York City (no return traffic volumes were calculated).
  - . Cost of terminal equipment and central station hardware was not included.
  - . All stations sent the same volume of traffic.

- The parameter variations are as follows:

- Double the number of cities (additional 25 not named).

- Double the number of messages per day.

- Double the length of messages.

- Change the transmission speed to 120 characters per second.

- At 120 cps, batch the traffic into one message.

- Quadruple the number of messages per day and the length of messages.

- Transmit this new traffic volume at 120 cps.

- Batch transmit this new traffic volume at 120 cps.

- The basic model, the parameter variations, and the monthly traffic volumes per station and per network are shown in Exhibit IV-1.

2. RESULTS OF THE PRICING MODEL

- As shown in Exhibit IV-2, for some of the variations the price range between different services is as much as ten times.

- Generally speaking, the circuit switched services (TWX, DDD, and WATS) are less expensive than the store and forward services (On-Tyme and InfoCom).

- The private wire solution is clearly not appropriate for this model or any of its variations. A shorter mileage, regional network, or a significantly higher traffic volume network would show PWS in a better relative position but probably still not the most economical alternative.

- WATS shows up as the least cost alternative even if an estimated $500 per month is added for a message switching capability at the central location.

EXHIBIT IV-1

BASIC NETWORK AND VARIATIONS

VARIATIONS					VOLUME SUMMARIES						
						PER STATION PER MONTH			PER NETWORK PER MONTH		
#	CITIES	MESSAGES (PER DAY)	MESSAGES LENGTH (CHARS.)	SPEED (CPS)	MIN./ MESSAGE	CHAR. (1,000)	MESSAGES	MINUTES	CHAR. (1,000)	MESSAGES	HOURS
BASIC	25	5	300	10	0.5	33	110	55	825	2,750	23
1	(50)	5	300	10	0.5	33	110	55	1,650	5,500	46
2	25	(10)	300	10	0.5	66	220	110	1,650	5,500	46
3	25	5	(600)	10	1.0	66	110	110	1,650	2,750	46
4	25	5	300	(120)	0.04	33	110	4.6	825	2,750	1.9
5	25	(1)	1,500	120	0.2	33	22	4.6	825	550	1.9
6	25	(20)	(1,200)	10	2.0	528	440	880	13,200	11,000	367
7	25	20	1,200	(120)	0.16	528	440	73	13,200	11,000	31
8	25	(1)	24,000	120	3.3	528	22	73	13,200	550	31

EXHIBIT IV-2

PRICING ANALYSIS OF ALTERNATIVE SERVICES

NUMBER	VARIATIONS				PRICE OF SERVICES PER MONTH					
	CITIES	MESSAGES (PER DAY)	MESSAGES LENGTH (CHARS.)	SPEED	TWX	DDD	WATS	ON-TYME	INFOCOM	PWS
B	25	5	300	10	$1,688	$1,732	$896	$1,392	$1,976	$6,487
1	50	5	300	10	3,377	3,465	1,732	2,685	3,363	11,927
2	25	10	300	10	2,964	3,052	1,319	2,272	2,800	6,487
3	25	5	600	10	1,688	1,732	1,319	1,392	2,800	6,487
4	25	5	300	120	N/A	1,732	658	1,388	2,131	7,054
5	25	1	1,500	120	N/A	676	658	699	2,131	7,054
6	25	20	1,200	10	10,620	9,432	7,113	6,369	8,420	6,987
7	25	20	1,200	120	N/A	5,692	1,043	5,621	8,350	7,054
8	25	1	24,000	120	N/A	1,237	1,043	1,405	8,350	7,054

- WATS is particularly advantageous when the transmission rate goes to 120 cps.

- On-Tyme is a powerful alternative in spite of the complex price structure.

  - Like WATS, it becomes more powerful at higher speed.

  - Unlike WATS, On-Tyme shows significant advantages when messages are batched.

B. ANALYSIS OF EXISTING ALTERNATIVES

- Over and above price, the other factors which could differentiate the various services are:

  - Network reliability.

  - Other message service interconnection.

  - Other equipment interconnection.

- On network reliability, much has already been said about TWX. InfoCom suffers from some of these same problems.

  - DDD and WATS are implemented on the highly reliable telephone network.

  - PWS network reliability is largely a function of the user's ability to manage his own network.

  - For On-Tyme, there are no available data.

- On other message service interconnection, such as international Telex, other companies' stations, and Mailgram, only two Western Union services have such a capability today. Those networks with a private message switcher, such as WATS based networks, could easily implement such interconnection.

- On other equipment interconnection such as high speed terminals and high speed computer connections, only On-Tyme has such a capability at present.

  - While this capability does not present a major deficiency to the other networks at present, it is certainly a consideration in the mind of any prospective user.

- With respect to future expectations of change among these alternatives:

  - TWX is now in the throes of a huge cutover to an all-WU plant. Once completed, the reliability problems should decline.

  - DDD/WATS/PWS will remain structurally unchanged. However, new central station equipment which can perform powerful functions in a network are becoming more widespread and may make these services, especially WATS, more attractive.

  - On-Tyme is a relatively new service. As it becomes better known it may pick up steam and penetrate more of the network market.

  - InfoCom has been falling behind in relative capabilities versus On-Tyme and dedicated switchers. Perhaps when WU gets over the TWX cutover program, more attention will be paid to this relatively powerful service.

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C. EXPECTATIONS OF FUTURE ALTERNATIVES

- While most of the new communications services being planned in the United States are oriented toward data applications, some, particularly Bell's Advanced Communications Service, can be used very effectively in message applications.

  - Until the rates are defined for such services, they are impossible to evaluate against the existing alternatives.

- Of perhaps greater consequence than new services as a competitive impact on DR/DS is the possible impact of new terminal and central station equipment, particularly the following:

  - The switcher type devices, such as Sidereal, which can be used for controlling multiple lines, both sending and receiving, buffering between lines, and performing a high volume message preparation function.

  - The intelligent terminals which, with declining prices, can be used very effectively as high operator efficiency outstation terminals.

  - The communicating word processors which may be called upon to take over the Telex/TWX function in smaller locations.

- These and other new hardware developments in conjunction with the already demonstrated economic advantages of the WATS tariffs may bring some interesting new systems into being.

  - Intelligent devices at central stations and at outstations, operating at high speed over WATS lines, are very likely the most powerful source of competition for some time to come.

APPENDIX A: SUMMARY OF SURVEYS

EXHIBIT A-1

SUMMARY OF TELEPHONE SURVEY

NUMBER OF STATIONS IN COMPANY	NUMBER OF COMPANIES				
	TOTAL	TLX	TWX	MORE THAN 80% INTER-NATIONAL	MORE THAN 75% INTRA-COMPANY
1	106	69	37	57	0
2	14	8	6	4	4
3-5	30	15	15	8	18
6-10	17	12	5	4	10
11-20	13	2	11	0	9
MORE THAN 20	19	9	10	1	15
UNKNOWN	2	0	2	1	1
TOTAL	201	115	86	75	57

EXHIBIT A-2

COMPANIES INTERVIEWED ON-SITE

1. Abbott Laboratories
2. ACF Industries
3. Aetna Insurance
4. AIRCO
5. Allied Chemical
6. Allied Mills
7. Amerada Hess
8. American Can
9. American Cyanamid
10. AMF
11. AMOCO Chemicals
12. Anaconda
13. Associated Spring
14. Blake, Moffitt and Towne
15. Bridgeport Brass
16. Certainteed
17. Cherron Chemical
18. Colgate Palmolive
19. Combustion Engineering
20. Continental Can
21. Cramer Electronics
22. Crown Cork and Seal
23. Crown Zellerbach
24. Drew Chemical
25. RR Donnelly
26. Dun and Bradstreet
27. Equilease
28. ESB
29. Fafnir Bearing
30. Firemans Fund Insurance
31. General Foods
32. Ingersoll Rand

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EXHIBIT A-2 (CONT.)
COMPANIES INTERVIEWED ON-SITE

33. Inmont
34. ITT-Continental Baking
35. Lone Star Cement
36. Maremont
37. McGraw Hill
38. Mobil Oil
39. M&T
40. Nash Engineering
41. Nestles
42. Olin
43. JC Penney
44. Prime Computer
45. Rockbestos
46. Joseph Ryerson
47. Santa Fe Railway
48. Seatrain
49. SKF Industries
50. Sorbus
51. Standard Brands
52. Stanley Works
53. Stauffer Chemical
54. St. Regis Paper
55. Torrington
56. Union Carbide
57. Uniroyal
58. Univac
59. Warner Lambert
60. Witco Chemical

NOTE: Number is not sequence number used to identify the interview.

EXHIBIT A-3

SUMMARY OF ON-SITE INTERVIEWS

INTERVIEW NUMBER	INDUSTRY	NUMBER OF STATIONS	APPLICATION	% OUTSIDE TRAFFIC	TYPE OF NETWORK	OTHER MESSAGE SYSTEM	DATA COMMUNI-CATION SYSTEM	SATIS-FACTION WITH TLX/TWX[1]	PLANS TO CHANGE
1	FOOD	36	CAR LOCATOR	95	ACCESS	YES	YES	0	YES
2	CEMENT	14	FINANCIAL INFO.	--	CLOSED	YES	NO	11	NO
3	RUBBER	25	CUSTOMER CONTACT	100	ACCESS	YES	YES	2	YES
4	FOOD	52	ORDERS	2	SUPPL.	NO	YES	12	NO
5	FAB. METAL	30	CUSTOMER SERVICE	30	CLOSED	YES	NO	11	YES
6	CHEMICAL	1	CUSTOMER CONTACT	100	ACCESS	YES	YES	GONE	NO
7	BEARINGS	25	SHIPPING INFO.	--	CLOSED	YES	NO	6	NO
8	FAB. METAL	5	EXPEDITING	35	CLOSED	YES	YES	10	NO
9	INSURANCE	47	POLICY INFO.	--	CLOSED	NO	YES	4	NO
10	FOOD	100	ACCOUNTING	--	CLOSED	NO	YES	4	YES
11	SPORTING GOODS	100	REPORTS	65	ACCESS	YES	YES	5	NO
12	BEARINGS	47	EXPEDITING	10	SUPPL.	YES	YES	7	NO

[1] SCALE OF 0-12. FOR EACH OF SIX FACTORS THERE IS A SCALE OF 0-2.

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SUMMARY OF ON-SITE INTERVIEWS

INTERVIEW NUMBER	INDUSTRY	NUMBER OF STATIONS	APPLICATION	% OUTSIDE TRAFFIC	TYPE OF NETWORK	OTHER MESSAGE SYSTEM	DATA COMMUNI-CATION SYSTEM	SATIS-FACTION WITH TLX/TWX	PLANS TO CHANGE
13	COMPUTERS	50	ORDERS	--	SUPPL.	YES	YES	2	YES
14	WHOLESALE	23	PARTS LOCATOR	1	CLOSED	NO	NO	7	NO
15	CHEMICAL	80	SALES ADMIN.	80	ACCESS	YES	YES	5	NO
16	BLDG. MATERIALS	17	QUOTES	--	CLOSED	NO	NO	3	NO
17	MACHINERY	200	ORDERS	10	SUPPL.	YES	YES	6	NO
18	CHEMICAL	56	ORDERS	2	CLOSED	YES	YES	3	YES
19	CHEMICAL	60	ORDERS	80	ACCESS	YES	YES	GONE	NO
20	CHEMICAL	75	ADMINISTRATION	95	ACCESS	YES	NO	7	NO
21	METALS	42	ORDERS	--	CLOSED	YES	NO	4	NO
22	METALS	2	CUSTOMER CONTACT	100	ACCESS	YES	NO	GONE	NO
23	MACHINERY	30	ORDERS	20	CLOSED	NO	YES	6	NO
24	CHEMICAL	700	EXPEDITING	75	ACCESS	YES	YES	1	NO

EXHIBIT A-3 (CONT.)

SUMMARY OF ON-SITE INTERVIEWS

INTERVIEW NUMBER	INDUSTRY	NUMBER OF STATIONS	APPLICATION	% OUTSIDE TRAFFIC	TYPE OF NETWORK	OTHER MESSAGE SYSTEM	DATA COMMUNI-CATION SYSTEM	SATIS-FACTION WITH TLX/TWX	PLANS TO CHANGE
25	MACHINERY	250	ORDERS	46	ACCESS	NO	YES	5	YES
26	CONTAINERS	300	ADMINISTRATION	--	SUPPL.	YES	YES	5	NO
27	PUBLISHING	150	AD. INFO.	10	SUPPL.	YES	NO	4	NO
28	FOOD	80	ORDERS	5	SUPPL.	YES	NO	12	NO
29	LEASING CO.	20	CREDIT INFO.	--	CLOSED	YES	NO	8	NO
30	LEASING CO.	20	CREDIT INFO.	--	CLOSED	NO	NO	7	NO
31	PAPER	15	INTERNATIONAL	100	ACCESS	YES	YES	2	YES
31	CHEMICAL	35	ADMINISTRATION	20	SUPPL.	YES	NO	7	NO
33	OIL	175	ADMINISTRATION	MOST	ACCESS	YES	YES	6	NO
34	CHEMICAL	25	ORDERS	MOST	ACCESS	YES	NO	GONE	NO
35	PHARMACEUTICAL	30	SALES CORRESP.	--	CLOSED	YES	YES	12	NO
36	CHEMICAL	15	SHIPPING INFO.	--	CLOSED	NO	NO	11	NO

SUMMARY OF ON-SITE INTERVIEWS

INTERVIEW NUMBER	INDUSTRY	NUMBER OF STATIONS	APPLICATION	% OUTSIDE TRAFFIC	TYPE OF NETWORK	OTHER MESSAGE SYSTEM	DATA COMMUNI-CATION SYSTEM	SATIS-FACTION WITH TLX/TWX	PLANS TO CHANGE
37	CHEMICAL	13	ADMINISTRATION	85	ACCESS	NO	YES	7	NO
38	OIL	90	BILLING	50	CLOSED	YES	YES	3	YES
39	RETAIL	100	PRICE CHANGE	--	CLOSED	NO	?	8	YES
40	CONTAINERS	18	CUSTOMER CONTACT	95	ACCESS	YES	YES	3	YES
41	TRANSPORATION	20	SHIPPING INFO.	5	CLOSED	NO	NO	7	NO
42	BUS. SERVICES	125	EQUIP. REPORTS	10	CLOSED	NO	YES	8	YES
43	BEARINGS	15	EXPEDITING	3	CLOSED	YES	NO	8	NO
44	COMPUTERS	1000	PRICING	--	SUPPL.	YES	YES	4	NO
45	BLDG. MATERIALS	85	PRICING	5	CLOSED	YES	YES	6	NO
46	CONTAINER	2	CUSTOMER CONTACT	100	ACCESS	YES	YES	GONE	NO
47	FAB. METALS	28	ORDERS	--	CLOSED	NO	NO	7	NO
48	CHEMICAL	12	SHIPPING INFO.	--	CLOSED	NO	NO	7	NO

EXHIBIT A-3

SUMMARY OF ON-SITE INTERVIEWS

INTERVIEW NUMBER	INDUSTRY	NUMBER OF STATIONS	APPLICATION	% OUTSIDE TRAFFIC	TYPE OF NETWORK	OTHER MESSAGE SYSTEM	DATA COMMUNI-CATION SYSTEM	SATIS-FACTION WITH TLX/TWX	PLANS TO CHANGE
49	TEXTILES	20	SHIPPING INFO.	100	ACCESS	YES	YES	GONE	NO
50	FAB. METALS	14	ORDERS	MOST	ACCESS	YES	YES	3	NO
51	CHEMICAL	50	--	95	ACCESS	YES	YES	3	NO
52	WHOLESALE	5	--	100	ACCESS	YES	YES	GONE	NO
53	TRANSPORTATION	35	CAR LOCATOR	95	ACCESS	YES	YES	GONE	NO
54	PUBLISHING	20	SCHEDULE	20	CLOSED	YES	YES	2	YES
55	PHARMACEUTICAL	35	ORDERS	15	CLOSED	YES	YES	5	NO
56	WHOLESALE	20	ORDERS	5	CLOSED	NO	YES	11	NO
57	INSURANCE	25	COVERAGE INFO.	20	SUPPL.	YES	YES	2	NO
58	PAPER	21	ADMINISTRATION	95	ACCESS	YES	YES	GONE	NO
59	CHEMICAL	200	ADMINISTRATION	30	ACCESS	YES	YES	9	YES
60	PUBLISHING	40	ADMINISTRATION	70	ACCESS	YES	YES	5	NO

APPENDIX B: PRICING MODEL

EXHIBIT B-1

TWX BASED NETWORK

VARIATION		ACCESS LINES	USAGE CHARGES	TOTAL COST
BASIC		$412.50	$ 1,276.00	$ 1,688.50
1	2X CITIES	825.00	2,552.00	3,377.00
2	2X MESSAGES	412.50	2,552.00	2,964.50
3	2X MESSAGE LENGTH	412.50	1,276.00	1,688.50
4	120 CPS	N/A	N/A	N/A
5	BATCHED	N/A	N/A	N/A
6	4X MESSAGES & LENGTH	412.50	10,208.00	10,620.50
7	120 CPS	N/A	N/A	N/A
8	BATCHED	N/A	N/A	N/A

EXHIBIT B-1 (CONT.)
TWX BASED NETWORK

NEW YORK CITY TO:	MILES	COST/MINUTE	COST/DAY
Chicago	712	.48X5	$ 2.40
Los Angeles	2,443	.52X5	2.60
Philadelphia	82	.40X5	2.00
Detroit	481	.48X5	2.40
San Francisco	2,564	.52X5	2.60
Washington, D.C.	206	.44X5	2.20
Boston	189	.44X5	2.20
St. Louis	871	.48X5	2.40
Pittsburgh	316	.44X5	2.20
Houston	1,417	.52X5	2.60
Minneapolis	1,009	.48X5	2.40
Cleveland	404	.48X5	2.40
Atlanta	747	.48X5	2.40
Denver	1,627	.52X5	2.60
Akron	394	.48X5	2.40
Hartford	99	.40X5	2.00
Raleigh	427	.48X5	2.40
Jacksonville	840	.48X5	2.40
Nashville	759	.48X5	2.40
Oklahoma City	1,324	.52X5	2.60
Phoenix	2,137	.52X5	2.60
Spokane	2,179	.52X5	2.60
Stockton	2,502	.52X5	2.60
San Diego	2,424	.52X5	2.60
TOTAL			$58.00

* Average cost per minute is $0.464.

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EXHIBIT B-2

DDD BASED NETWORK

VARIATION		ACCESS LINES	USAGE CHARGES	TOTAL COST
BASIC		$412.50[1]	$1,320.00	$1,732.50
1	2X CITIES	825.00	2,640.00	3,465.00
2	2X MESSAGES	412.50	2,640.00	3,052.50
3	2X MESSAGE LENGTH	412.50	1,320.00	1,732.50
4	120 CPS	412.50	1,320.00	1,732.50
5	BATCHED	412.50	264.00	676.50
6	4X MESSAGES & LENGTH	412.50	9,020.00	9,432.50
7	120 CPS	412.50	5,280.00	5,692.50
8	BATCHED	412.50	825.00	1,237.50

[1] BUSINESS LINE ASSUMED AT $16.50 PER MONTH

EXHIBIT B-2 (CONT.)
DDD BASED NETWORK

NEW YORK CITY TO:	MILES	COST/MINUTE	COST/DAY
Chicago	712	.50X5	$ 2.50
Los Angeles	2,443	.54X5	2.70
Philadelphia	82	.43X5	2.15
Detroit	481	.50X5	2.50
San Francisco	2,564	.54X5	2.70
Washington, D.C.	206	.46X5	2.30
Boston	189	.44X5	2.20
St. Louis	871	.50X5	2.50
Pittsburgh	316	.48X5	2.40
Houston	1,417	.52X5	2.60
Minneapolis	1,009	.52X5	2.60
Cleveland	404	.48X5	2.40
Atlanta	747	.50X5	2.50
Denver	1,627	.52X5	2.60
Akron	394	.48X5	2.40
Hartford	99	.43X5	2.15
Raleigh	427	.48X5	2.40
Jacksonville	840	.50X5	2.50
Nashville	759	.50X5	2.50
Oklahoma City	1,324	.52X5	2.60
Phoenix	2,137	.54X5	2.70
Spokane	2,179	.54X5	2.70
Stockton	2,502	.54X5	2.70
San Diego	2,424	.54X5	2.70
TOTAL			$60.00

*Cost shown is for first minute. Variations 6 and 9 use additional minutes, averaged at $0.34/minute.

EXHIBT B-3

WATS BASED NETWORK

VARIATION		ACCESS LINES	USAGE CHARGES	TOTAL COST
BASIC		$412.50[1]	$ 483.94[2]	$ 896.44
1	2X CITIES	825.00[1]	906.68[2]	1,731.68
2	2X MESSAGES	412.50[1]	906.68[2]	1,319.18
3	2X MESSAGE LENGTH	412.50[1]	906.68[2]	1,319.18
4	120 CPS	412.50[1]	245.00[2]	657.50
5	BATCHED	412.50[1]	245.00[2]	657.50
6	4X MESSAGE & LENGTH	412.50[1]	6,700.00[2]	7,112.50
7	120 CPS	412.50[1]	630.98[2]	1,043.48
8	BATCHED	412.50[1]	630.98[2]	1,043.48

[1] BUSINESS LINE ASSUMED AT $16.50 PER MONTH

[2] ONE (1) MEASURED TIME BAND 5 WATS LINE FOR ALL VARIATIONS EXCEPT #6. VARIATION 6 REQUIRES 4 FULL BUSINESS DAY BAND 5 WATS LINES.

EXHIBIT B-4

ON-TYME BASED NETWORK

VARIATION		CUSTOMER SERVICE CHARGE	ACCESS LINES	ACCESS CHARGES	TRANSMIT CHARGE	MESSAGE SWITCH CHARGE	TOTAL COST
BASIC		$100.00	$412.50	$ 412.50	$ 330.00	$137.50	$1,392.50
1	2X CITIES	100.00	825.00	825.00	660.00	275.00	2,685.00
2	2X MESSAGES	100.00	412.50	825.00	660.00	275.00	2,272.50
3	2X MESSAGE LENGTH	100.00	412.50	412.50	330.00	137.50	1,392.50
4	120 CPS	100.00	412.50	600.60	137.50	137.50	1,388.10
5	BATCHED	100.00	412.50	103.62	55.00	27.50	698.62
6	4X MESSAGES AND LENGTH	100.00	412.50	2,666.40	2,640.00	550.00	6,368.90
7	120 CPS	100.00	412.50	3,458.40	1,100.00	550.00	5,620.90
8	BATCHED	100.00	412.50	205.04	660.00	27.50	1,405.04

EXHIBIT B-4 (CONT.)
ON-TYME BASED NETWORK

	COST PER MINUTE	
	10 CPS	120 CPS
12 LO	.08	.10
9 HI	.04	.06
1 FX	.12	.14
3 WATS	.25	.25

Akron	LO
Atlanta	LO
Boston	HI
Chicago	HI
Cleveland	LO
Dallas	LO
Denver	HI
Detroit	HI
Hartford	LO
Houston	HI
Jacksonville	FX
Los Angeles	HI
Minneapolis	LO
Nashville	WATS
New York	HI
Oklahoma City	LO
Philadelphia	HI
Phoenix	LO
Pittsburgh	LO
Raleigh	LO
St.Louis	LO
San Diego	LO
San Francisco	HI
Spokane	WATS
Stockton	WATS

EXHIBIT B-5

INFOCOM BASED NETWORK

VARIATION		ACCESS LINES	USAGE CHARGES	TOTAL COST
BASIC		$ 750.00[1]	$1,225.60[2]	$1,975.60
1	2X CITIES	1,312.50[1]	2,050.00[2]	3,362.50
2	2X MESSAGES	750.00[1]	2,050.00[2]	2,800.00
3	2X MESSAGE LENGTH	750.00[1]	2,050.00[2]	2,800.00
4	120 CPS	980.00[3]	1,150.60[2]	2,130.60
5	BATCHED	980.00[3]	1,150.60[2]	2,130.60
6	4X MESSAGES & LENGTH	1,650.00[4]	6,770.00[2]	8,420.00
7	120 CPS	1,880.00[5]	6,470.00[2]	8,350.00
8	BATCHED	1,880.00[5]	6,470.00[2]	8,350.00

[1] NYC = CLASS ID, ALL OTHERS CLASS 4C

[2] SPECIAL ASSUMPTION FOR INFO-COM. FIFTY PERCENT (50%) TRAFFIC IS TO NYC, 50% TRAFFIC IS FROM NYC. REASON: ASYMETRIC RATE STRUCTURE.

[3] NYC = CLASS IE 1200 BPS. ALL OTHERS CLASS 4C (110 BPS).

[4] NYC = CLASS ID. ALL OTHERS CLASS 2C (110 BPS).

[5] NYC = CLASS IE 1200 BPS. ALL OTHERS CLASS 2C (110 BPS).

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EXHIBIT B-6

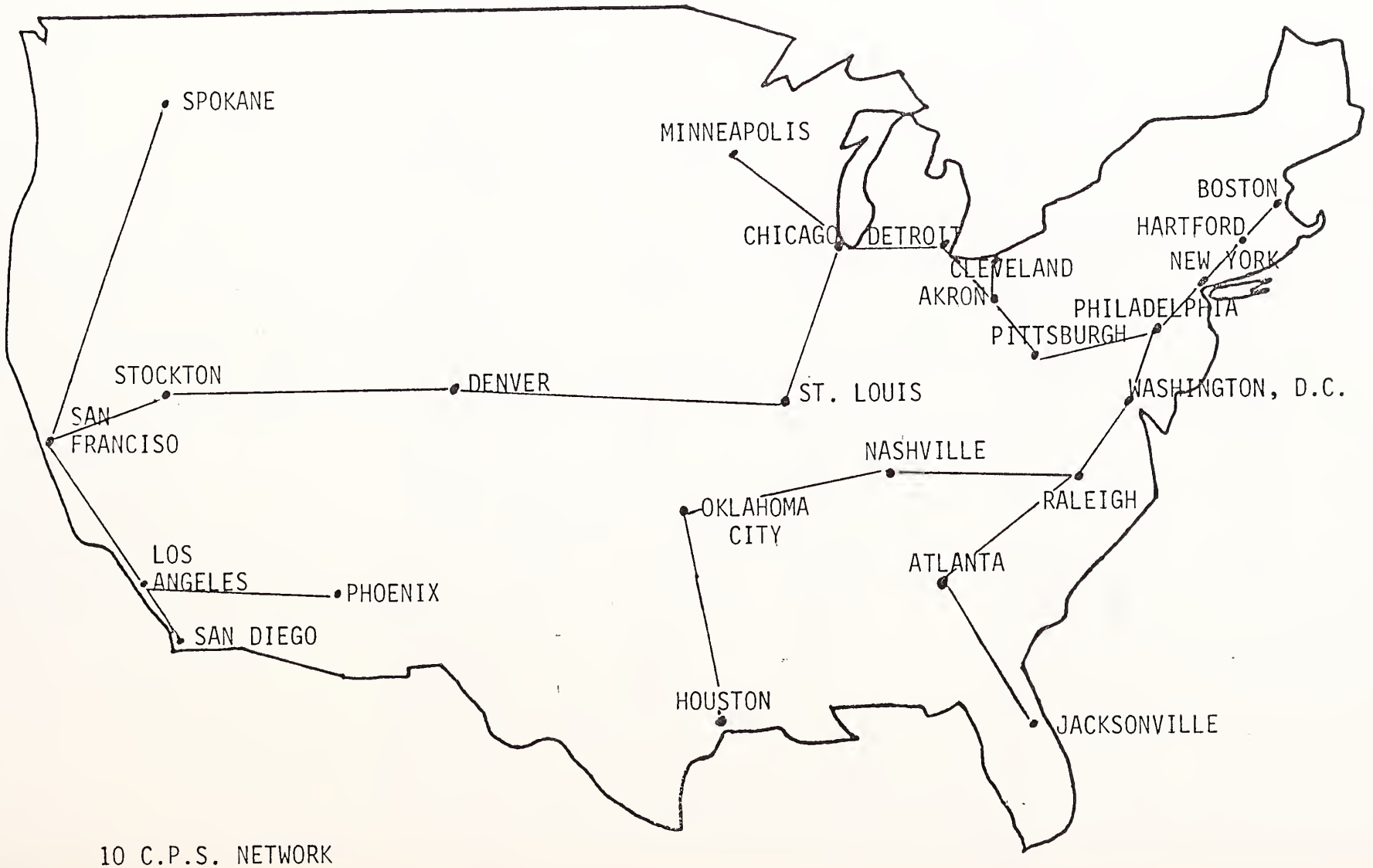
PRIVATE WIRE SYSTEM BASED NETWORK

VARIATION		ACCESS LINES	MILEAGE CHARGES	TOTAL COST
BASIC		$2,300.00[1]	$4,187.01	$ 6,487.01
1	2X CITIES	4,600.00[1]	7,327.26	11,927.26
2	2X MESSAGES	2,300.00[1]	4,187.01	6,487.01
3	2X MESSAGE LENGTH	2,300.00[1]	4,187.01	6,487.01
4	120 CPS	2,300.00[1]	4,754.17	7,054.17
5	BATCHED	2,300.00[1]	4,754.17	7,054.17
6	4X MESSAGES & LENGTH	2,400.00[1]	4,587.01[2]	6,987.01
7	120 CPS	2,300.00[1]	4,754.17	7,054.17
8	BATCHED	2,300.00[1]	4,754.17	7,054.17

1 AVERAGE OF $100.00 FOR CHANNEL AND STATION TERMINAL CHARGES.
2 TRAFFIC VOLUME DICTATES ADDITIONAL DIRECT CIRCUITS. DENVER-NEW YORK AND PITTSBURGH-NEW YORK.

EXHIBIT B-6 (CONT.)

PLUS BASED NETWORK



10 C.P.S. NETWORK

120 C.P.S. NETWORK

INPUT

EXHIBIT B-6 (CONT.)
PRIVATE WIRE SYSTEM 10 C.P.S.
(150 BAUD) 1006 WESTERN UNION

	MILES	COST/MONTH
Boston-Hartford	93	$ 183.51
Hartford-NYC	99	188.13
NYC-Philadelphia	82	175.04
Philadelphia-Washington D.C.	124	207.38
Philadelphia-Pittsburgh	258	263.04
Washington D.C.-Raleigh	233	254.79
Raleigh-Atlanta	355	295.05
Atlanta-Jacksonville	284	271.62
Raleigh-Nashville	455	328.05
Nashville-Oklahoma City	604	377.22
Oklahoma City-Houston	410	313.20
Pittsburgh-Cleveland	114	199.68
Cleveland-Akron	30	128.20
Akron-Detroit	117	201.99
Detroit-Chicago	240	259.70
Chicago-St. Louis	270	267.20
Chicago-Minneapolis	420	317.62
St. Louis-Denver	795	440.25
Denver-Stockton	883	469.89
Stockton-San Francisco	62	158.28
San Francisco-Spokane	730	418.80
San Francisco-Los Angeles	351	293.75
Los Angeles-San Diego	113	198.91
San Diego-Phoenix	298	276.34
TOTAL		$6,487.64

EXHIBIT B-6 (CONT.)
PRIVATE WIRE SYSTEM 10 C.P.S.

	MILES	COST/MONTH
Boston-Hartford (Off Net)	93	$ 217.36
Hartford-NYC (Off Net)	99	224.08
NYC-Philadelphia	82	172.80
Philadelphia-Washington D.C.	124	188.40
Philadelphia-Pittsburgh	258	251.70
Washington D.C-Raleigh (Off Net)	233	312.98
Raleigh-Atlanta (Off Net)	355	393.50
Atlanta-Jacksonville (Off Net)	284	346.64
Raleigh-Nashville (Off Net)	455	459.50
Nashville-Oklahoma City (Off Net)	604	577.84
Oklahoma City-Houston	410	280.50
Pittsburgh-Cleveland	114	184.90
Cleveland-Akron (Off Net)	30	131.80
Akron-Detroit (Off Net)	117	236.42
Detroit-Chicago	240	246.50
Chicago-St. Louis	270	260.20
Chicago-Minneapolis	420	284.50
St. Louis-Denver	795	381.25
Denver-Stockton	883	403.25
Stockton-San Francisco	62	164.80
San Francisco-Spokane (Off Net)	730	641.00
San Francisco-Los Angeles	351	262.80
Los Angeles-San Diego	113	184.55
San Diego-Phoenix	298	246.90
TOTAL		$7,054.17

APPENDIX C: GEOGRAPHIC DISTRIBUTION

EXHIBIT C-1

100 LARGEST METROPOLITAN AREAS

1. New York City
   - Nassau
   - Newark
   - New Brunswick
   - Jersey City
   - Long Branch
   - Paterson
2. Los Angeles
   - Anaheim
   - Riverside
   - Oxnard
3. Chicago
   - Gary
4. Philadelphia
5. Detroit
6. San Francisco
   - San Jose
7. Washington D.C.
8. Boston
9. Dallas
10. Houston
11. St. Louis
12. Pittsburgh
13. Baltimore
14. Minneapolis
15. Cleveland
    - Akron
16. Atlanta
17. San Diego
18. Miami
    - Fort Lauderdale
19. Denver
20. Seattle
21. Milwaukee
22. Tampa
23. Cincinnati
24. Buffalo
25. Kansas City.
26. Phoenix
27. Indianapolis
28. New Orleans
29. Portland, OR
30. Columbus, OH
31. San Antonio
32. Rochester, NY
33. Sacramento
34. Providence
35. Louisville
36. Memphis
37 Dayton

EXHIBIT C-1 (CONT.)

100 LARGEST METROPOLITAN AREAS

38. Salt Lake City
39. Birmingham
40. Albany, NY
41. Norfolk
    Newport News
42. Toledo
43. Greensboro
44. Nashville
45. Oklahoma City
46. Hartford
47. Jacksonville
48. Syracuse
49. Scranton
50. Allentown
51. Tulsa
52. Richmond
53. Charlotte
54. Orlando
55. Omaha
56. Grand Rapids
57. Springfield, MA
58. Youngstown
59. Greenville, SC
60. Wilmington, DE
61. Raleigh
62. West Palm Beach
63. Fresno
64. Austin
65. Tucson
66. Lansing
67. Knoxville
68. El Paso
69. Harrisburg
70. Baton Rouge
71. Tacoma
72. Mobile
73. New Haven
74. Canton
75. Johnson City, TN
76. Bridgeport, CT
77. Chattanooga
78. Albuquerque
79. Wichita
80. Charleston, SC
81. Worcester, MA
82. Davenport
83. Columbia, SC
84. Fort Wayne

EXHIBIT C-1 (CONT.)

100 LARGEST METROPOLITAN AREAS

85. Little Rock
86. Peoria
87. Beaumont
88. Bakersfield
89. Shreveport
90 York, PA
91. Las Vegas
92. Lancaster, PA
93. Des Moines
94. Utica
95. Trenton
96. Madison, WI
97. Spokane
98. Binghamton
99. Reading, PA
100. Stockton

EXHIBIT C-2

100 MULTI-STATION COMPANIES BY 100 LARGEST METROPOLITAN AREAS

POPULATION RANK	AREA NAME	NUMBER OF STATIONS	CUMULATIVE PERCENTAGE
1	New York City	254	7.0 %
2	Los Angeles	212	12.8
3	Chicago	122	16.8
4	Philadelphia	112	19.2
5	Detroit	108	22.1
6	San Francisco	107	25.1
7	Washington D.C.	31	25.9
8	Boston	73	27.9
9	Dallas	90	30.4
10	Houston	72	32.4
11	St. Louis	54	33.8
12	Pittsburgh	45	35.1
13	Baltimore	40	36.2
14	Minneapolis	46	37.4
15	Cleveland	70	39.4
16	Atlanta	94	41.9
17	San Diego	20	42.5
18	Miami	43	43.7
19	Denver	64	45.4
20	Seattle	43	46.6

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EXHIBIT C-2 (CONT.)

100 MULTI-STATION COMPANIES BY 100 LARGEST METROPOLITAN AREAS

POPULATION RANK	AREA NAME	NUMBER OF STATIONS	CUMULATIVE PERCENTAGE
21	Milwaukee	25	47.3%
22	Tampa	13	47.6
23	Cincinnati	44	48.8
24	Buffalo	26	49.5
25	Kansas City	37	50.6
26	Phoenix	23	51.2
27	Indianapolis	34	52.1
28	New Orleans	21	52.7
29	Portland, OR	36	53.7
30	Columbus, OH	36	54.7
31	San Antonio	16	55.1
32	Rochester, NY	13	55.5
33	Sacramento	11	55.8
34	Providence	4	55.9
35	Louisville	16	56.3
36	Memphis	29	57.1
37	Dayton	29	57.9
38	Salt Lake City	20	58.5
39	Birmingham	15	58.9
40	Albany, NY	11	59.2
41	Norfolk	12	59.5
42	Toledo	18	60.0
43	Greensboro	9	60.2
44	Nashville	18	60.7
45	Oklahoma City	26	61.4
46	Hartford	24	62.1
47	Jacksonville	18	62.6
48	Syracuse	13	62.9

EXHIBIT C-2 (CONT.)

100 MULTI-STATION COMPANIES BY 100 LARGEST METROPOLITAN AREAS

POPULATION RANK	AREA NAME	NUMBER OF STATIONS	CUMULATIVE PERCENTAGE
49	Scranton	2	63.0%
50	Allentown	5	63.1
51	Tulsa	36	64.1
52	Richmond	17	64.6
53	Charlotte	41	65.7
54	Orlando	14	66.1
55	Omaha	21	66.7
56	Grand Rapids	10	66.9
57	Springfield, MA	4	67.1
58	Youngstown	5	67.2
59	Greenville, SC	3	67.3
60	Wilmington, DE	5	67.5
61	Raleigh	7	67.6
62	West Palm Beach	1	67.6
63	Fresno	4	67.7
64	Austin	5	67.9
65	Tucson	6	68.0
66	Lansing	1	68.1
67	Knoxville	9	68.3
68	El Paso	2	68.4
69	Harrisburg	4	68.5
70	Baton Rouge	16	68.9
71	Tacoma	5	69.1
72	Mobile	7	69.3
73	New Haven	4	69.4
74	Canton	7	69.6
75	Johnson City, TN	0	69.6
76	Bridgeport, CT	0	69.8

EXHIBIT C-2 (CONT.)
100 MULTI-STATION COMPANIES BY 100 LARGEST METROPOLITAN AREAS

POPULATION RANK	AREA NAME	NUMBER OF STATIONS	CUMULATIVE PERCENTAGE
77	Chattanooga	8	69.8%
78	Albuquerque	11	70.1
79	Wichita	11	70.4
80	Charleston, SC	2	70.4
81	Worchester, MA	3	70.5
82	Davenport	7	70.7
83	Columbia, SC	2	70.4
84	Fort Wayne	4	71.0
85	Little Rock	5	71.1
86	Peoria	17	71.6
87	Beaumont	3	71.7
88	Bakersfield	1	71.7
89	Shreveport	8	71.9
90	York, PA	1	71.9
91	Las Vegas	4	72.0
92	Lancaster, PA	0	72.0
93	Des Moines	12	72.4
94	Utica	2	72.5
95	Trenton	3	72.5
96	Madison, WI	4	72.6
97	Spokane	4	72.7
98	Binghamton	1	72.8
99	Reading, PA	0	
100	Stockton	0	
		2,651	72.8
	Other Areas	998	27.2
	Total	3,649	100.0%

EXHIBIT C-3
CITY DISTRIBUTION BY COMPANY

Company Name	Total Stations	# Of Stations In Top 100 Areas	% Of Stations In Top 100 Areas
Arthur Anderson	54	48	89%
Assoc. Airfreight	30	23	77
Assoc. Spring*	17	6	35
Anaconda*	36	23	64
Amerford Intl. Corp.	25	19	76
Anchor Hocking	40	31	78
Aetna Ins.*	41	34	83
Armco Steel	63	41	65
Abbott Labs*	27	24	89
Babcock & Wilcox	62	53	85
Bache & Company	37	37	100
Beckman Instrument	29	25	86
Bemis	33	22	67
Bendix	83	60	72
John Blair & Co.	22	22	100
Boise Cascade	54	41	76
Bosco Fastening	21	21	100
Bryant Air Cond.	23	20	87
Budd Company	27	22	81
Burroughs	229	200	87

*COMPANIES ALSO INTERVIEWED ON-SITE

EXHIBIT C-3 (CONT.)
CITY DISTRIBUTION BY COMPANY

Company Name	Total Stations	# Of Stations In Top 100 Areas	% Of Stations In Top 100 Areas
CBS Records	25	21	84%
C-E Refractories*	27	20	74
Cascade Natural Gas	18	2	11
Certainteed	77	61	79
Cities Service	51	35	69
Colgate Palmolive	21	20	95
Coca Cola	44	39	89
Colonial Pipeline	17	6	35
Comm. Shearing Inc.	16	11	69
Consolidated Aluminum	11	3	27
Cook Paint	12	11	92
Crane Packing	23	15	65
Crown Cork & Seal*	24	13	54
Crown Zellerbach*	20	9	45
Cyprus Wire & Cable	14	10	71
Data General	96	82	85
Davis Meter & Supply	12	8	67
John Deere	40	14	35
Deluxe Check Printers	47	39	83
Depuy Manufacturing	25	14	56

*COMPANIES ALSO INTERVIEWED ON-SITE

EXHIBIT C-3 (CONT.)
CITY DISTRIBUTION BY COMPANY

Company Name	Total Stations	# Of Stations In Top 100 Areas	% Of Stations In Top 100 Areas
Digital Equipment	21	14	67%
F. W. Dodge	41	40	98
Eaton Corporation	82	51	62
Elixir Industries, Inc.	28	11	39
Fafnir Bearing*	25	22	88
Flintkote	40	36	90
Ford Motor Co.	84	74	88
Foxboro	59	47	80
General Foods*	19	15	79
General Tire	27	12	44
Grinnell Fire Protect	26	16	62
Gould, Inc.	93	66	71
Harris Corp.	52	45	87
Houghton Mifflin	9	5	56
Howard Brothers Discount	78	7	9
Hyatt Hotels	28	26	93
IBM	24	17	71
Inmont Corp.*	60	50	83
ITT Cont. Baking*	57	43	75
Joy Mfg. Co.	49	27	55

*COMPANIES ALSO INTERVIEWED ON-SITE

EXHIBIT C-3 (CONT.)
CITY DISTRIBUTION BY COMPANY

Company Name	Total Stations	# Of Stations In Top 100 Areas	% Of Stations In Top 100 Areas
Lone Star Cement*	18	15	83%
Maremont Corp.*	20	10	50
Maxon Corp.	13	7	54
McGraw Edison	63	40	63
McJunkin Corp.	35	10	29
Mead Corp.	50	27	54
Midland Ross	20	10	50
Missouri, Kansas, Texas RR	31	26	84
Morgano Drive-Away	17	7	41
Mosler Safe	39	34	87
Nash Engineer*	20	15	75
Nat'l Assoc. of Mfg.	12	11	92
National Car Rental	24	16	67
National Mine Services	14	2	14
National Starch	21	12	57
Northrup	28	26	93
Owens Corning	61	40	66
Pacesetters	20	15	75
Plessey Inc.	36	32	89
Polaroid	17	16	94

*COMPANIES ALSO INTERVIEWED ON-SITE

EXHIBIT C-3 (CONT.)
CITY DISTRIBUTION BY COMPANY

Company Name	Total Stations	# Of Stations In Top 100 Areas	% Of Stations In Top 100 Areas
Purolator	78	70	90%
Realty World	26	25	96
Reichhold Chemical	42	26	62
Joseph Ryerson & Sons*	28	25	89
Saxon Business Prod.	42	39	93
Sierra Nevada Labs.	16	3	19
Sorbus, Inc.*	54	53	98
Stanley Works*	20	17	85
Stone & Webster	32	25	78
Toledo Scale	65	53	82
Transilwrap	20	13	65
Uniroyal*	23	11	48
U. S. Envelopes	11	9	82
Value City Furniture	12	8	67
B. F. Walker, Inc.	17	10	59
Walker Williams	20	15	75
Warner Brothers	18	18	100
Worthington	77	62	81
Wrenn Brothers	17	10	59
Zantop Airlines	17	14	82

*COMPANIES ALSO INTERVIEWED ON-SITE

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APPENDIX D: COMPANIES WITH TEN OR MORE TELEX/TWX STATIONS

APPENDIX D: COMPANIES WITH TEN OR MORE TELEX/TWX STATIONS

20 FOOD & KINDRED PRODUCTS (12)

ITT Continental Bakers
Wonder Bread
Coca Cola
Peter Paul
Allied Mills, Inc.
General Foods
Hunt-Wesson
Kraft, Inc.
Nestle
Standard Brands
Stakeley-Van Camp
Valmac Industries

22 TEXTILE MILL PRODUCTS (5)

Avondale Mills
Kendall Company
Milliken & Co.
West Point Pepperell
Threads, Inc.

24 LUMBER & WOOD PRODUCTS (7) except furniture

American Forest Products
Certainteed Corporation
Flintkote
Georgia Pacific
Louisiana-Pacific
Masonite Corporation
Elixir Industries, Inc.

25 FURNITURE & FIXTURES (1)

Boise Cascade

26 PAPER & ALLIED PRODUCTS (15)

Bemis
Mead Corporation
Packaging Corporation of America
Curtis 1000, Inc.
U.S. Envelope
International Paper
St. Regis Paper
Blake Moffitt & Towne
Champion Papers
Crown Zellerbach
ITT Rayonier
Mead Paper
Potlatch Corporation
Weyerhauser
Reed Forest Products, Inc.

27 PRINTING, PUBLISHING & ALLIED INDUSTRIES (5)

Deluxe Check Printers
R.R. Donnelly & Sons
Globe Ticket Co.
Wallace Business Forms
Houghton Mifflin Co.

28 CHEMICALS & ALLIED PRODUCTS (33)

Air Products & Chemicals
Allied Chemical
American Cyanamid
Borden, Inc.
Dow Chemical
Drew Chemical
Dupont
Exxon Chemical
W. R. Grace & Co.
Hooker
J.M. Huber Corp.
ICI America
Kerr McGee
Kaiser
M&T Chemicals
Monsanto
Reichhold Chemical
Rhodia, Inc.
Rohn & Haas
Stauffer Chemical
Thiokal
Union Carbide
Witka Chemical
Cascade Natural Gas Corporation
Airco
Inmont Co.
Abbott Labs
Parke Davis
H. B. Fuller
National Starch
Colgate Palmolive
J.H. Baxter Co.
Koppers Co.

29 PETROLEUM REFINING & RELATED INDUSTRIES (11)

Amerada Hess
Amoco
Chevron
Cities Service
Continental Oil
Exxon
Gulf Oil
Mobil
Shell
Standard
Texaco

30 RUBBER & MISC. PLASTIC (8)

Pacesetters
Walker William & Co.
Commercial Plastics & Supplies Co.
Transilwrap Co., Inc.
Goodall Rubber Co.
Uniroyal
General Tire
Michelin Tire

32 STONE, CLAY, GLASS & CONCRETE PRODUCTS (12)

Owens Corning
Lone Star
Anchor Hacking
Corning Glass
Kerr Glass
Libbey-Owens Ford
Certainteed Corporation
Babcock & Wilcox
C-E Refractories
General Refractories
Green A P Refractories
Harbison Walker Refractories

33 PRIMARY METAL INDUSTRIES (12)

Alcan Aluminum
Anaconda
Bridgeport Brass Co.
Philips Dodge Corporation
Stanley Works
Consolidated Aluminum
Armco Steel
Ceco Corporation
Kurt Orban Co.
Ryerson Joseph T. & Son
Uddeholm Steel
Plessey, Inc.

34 FABRICATED METAL PRODUCTS except mach. & trans. equip. (10)

American Can Co.
Continental Can
Crown Cork & Sear
Grinnell Fire Protection
Joy Manufacturing Co.
Mosler Safe Co.
Spider-Staging Sales Co.
Associated Spring
Cyprus Wire & Cable
Rockbestos

35 MACHINERY, except electrical (37)

Fafrin Bearing Co.
SKF Industries
Torrington Co.
Dresser
Gardner-Denver
Worthington
Symons Corp.
Terex Div. General Motors
Saxon Business Products
John Deere & Co.
Commercial Shearing, Inc.
Vickers Div. Sperry Rand
McJunkin Corporation
Cincinnati Milacron, Inc.
Warner & Swosy, Inc.
Wrenn Bros, Inc.
National Mine Services
Whitney Supply Co.
Anchor Packing Co.
Crane Packing
Sullain
Bryant Air Conditioning
Carrier Corporation
Trance-Dim Borg Warner
Mergenthaler Linotype
Worthington
Berkeley Pump Co.
Toledo Scale
Senco Products, Inc.
Doall Co.
Ingersall Rand
Kennametal
Allis Chalmers
De Lanal Turbine, Inc.
Lexitron Corporation
Nash Engineering
Stockholm Valves & Fittings

36 ELECTRICAL & ELECTRONIC MACHINERY, EQUIPMENT & SUPPLIES (42)

Gould, Inc.
ESB, Inc.
Burroughs
Duplex Products
SCM
Standard Register
IBM
Data General
Documation, Inc.
Four Phase Systems
Interdata, Inc.
Prime Computer
Foxboro
Robertshaw Controls
Data 100
Digital Equipment
Mohawk Data Science Corporation
Pertes Computer Corporation
Raytheon
Univac
McGraw Edison
ITE Imperial Corporation
General Electric
Sprague Electric
Midland Ross
Federal Pacific
Bunker Ramo
Cramer Electronics
Harris Semiconductor
Hewlitt Pakcard
Intel Corporation
Litton Industries
Magnavox
RCA Corporation
TRW
Motorola
Varian Associates
Westinghouse
Maxon Corporation
CBS Records
Lincoln Electric Co.
Liquid Air, Inc.

37 TRANSPORTATION EQUIPMENT (15)

Lockheed
Ford Motor
Eaton Corporation
Falk Corporation
Budd Co.
Mack Trucks
Northrop
Piper Aircraft
Garrett Corporation
Cessna
Boeing
Hughes Aircraft
Lear Siegler
Pratt & Whitney
Bendix

38 MEASURING, ANALYZING & CONTROLLING INSTRUMENTS (10)

Depuy Mfg. Co.
Curtin Mathew Scientific
Davis Meter & Supply
Eastman Kodak
Polaroid Corporation
American Safety Co.
Beckman Instruments Co.
Jensen Salsberg Labs
CGR Medical Corporation
Sieman's, Inc.

39 MISC. MANUFACTURING INDUSTRIES (3)

Batesville Casket Co.
Bosco Fastening Service
YKK Zippers Co.

40 RAILROAD TRANSPORTATION (9)

Amtrak
Frisco Railway
Louisville & Nashville RR
Missouri, Kansas, Texas RR
Missouri Pacific
Norfolk & Western
Santa Fe Railway
Seaboard Coast Lines
Soo Line RR

42 MOTOR FREIGHT TRANS AND WAREHOUSING (2)

Purolator
B.F. Walker, Inc.

44 WATER TRANSPORTATION (7)

Hansen & Tidemann, Inc.
Kerr SS Co., Inc.
Malisk Line Agency
Norton Lilly & Co.
Strachan Shipping Co.
Farrell Lines Co.
Seatrain Lines

45 TRANSPORTATION BY AIR (3)

Associated Air Freight
Allied Air Freight
Circle Air Freight

46 PIPELINES (1)

Colonial Pipeline Co.

47 TRANSPORTATION SERVICES (8)

Acme Fast Freight
Amerford International Corporation
Harper Robinson & Co.
Merchant Shippers
Pacific Forwarding
Star Dar Freight System, Inc.
Morgan Drive-Away
ACF Industries

50 WHOLESALE TRADE (4)
durable goods

Morubeni American Corporation
Mitsakiski International Corporation
P.E. Chair & Co.
Handleman Co.

51 WHOLESALE TRADE (1)
non-durable goods

Cook Paint Co.

53 GENERAL MERCHANDISE STORES (3)

Harvard Bros. Discount Stores
J.C. Penny
Montgomery Ward

55 AUTOMOTIVE DEALERS & SERVICE (3)

Volkswagon
Telex-Benz
Maremont Corporation

57 FURNITURE, HOME FURNISHINGS AND EQUIPMENT STORES (1)

Value City Furniture

62 SECURITY & COMMODITY BROKERS, DEALERS, SERVICES & EXCHANGES (3)

Bache & Co.
Quotion Systems, Inc.
Elkins Straud & Co.

64 INSURANCE AGENTS, BROKERS, AND SERVICE (12) (12)

Aetna Insurance Co.
Aetna Life & Casualty
Alexander & Alexander
Allendale Insurance
Continental Casualty
Crown Life
Factory Mutual
Firemen's Fund
Home Insurance
Liberty Mutual
Sum Life
USF & Co.

65 REAL ESTATE (2)

Realty World
De Bartalo Edward J. Corporation

70 HOTELS, ETC. (1)

Hyatt Hotels

73 BUSINESS SERVICES (9)

Data Documents, Inc.
SORBUS, Inc.
Equilease, Inc.
Nationwide Advertising
Commercial Appeal News Agency
F.W. Dodge
PR Newswire
Dun & Bradstreet
Applied Data Research

75 AUTOMOTIVE REPAIR, SERVICES, AND GARAGES (4)

American International Rent-A-Car
Gil-Flex
National Car Rental
Dollar

76 MISC. REPAIR SERVICES (1)

John Blair & Co.

78 MOTION PICTURES (2)

20th Century Fox
Warner Bros. Picture Dist.

80 HEALTH SERVICES (1)

Sierra Nevada Labs, Inc.

83 SOCIAL SERVICES (1)

National Association of Mfgrs.

89 MISCELLANEOUS SERVICES (8)

Stone & Webster Engineering
Dames & Moore
Arthur Anderson
Deloitte Haskins & Sells
Coopers & Lykand
Ernst & Ernst
Price Waterhouse
Arthur Young & Co.

APPENDIX E: QUESTIONNAIRES

DATE_____

GOOD MORNING/AFTERNOON, MY NAME IS _____ AND I REPRESENT INPUT INC., AN INDEPENDENT RESEARCH FIRM CURRENTLY CONDUCTING A STUDY OF THE COMMUNICATIONS INDUSTRY. WE HAVE SELECTED YOUR FIRM NAME AT RANDOM FROM THE TELEX/TWX DIRECTORY TO HELP US IN OUR STUDY. MAY I HAVE YOUR HELP IN TALKING TO THE PERSON MOST FAMILIAR WITH THE USE OF YOUR TELEX/TWX MACHINE.

1. APPROXIMATELY HOW MANY TELEX/TWX MESSAGES DOES YOUR STATION

   SEND_____ RECEIVE_____ (DAILY ( ) WEEKLY ( ) MONTHLY ( )

2. ARE MOST OF THESE MESSAGES WITHIN YOUR OWN COMPANY_____

   OR TO OUTSIDE COMPANIES_____ % INSIDE_____% OUTSIDE_____

3. ARE MOST OF THE MESSAGES WITHIN THE US OR TO FOREIGN COUNTRIES

   US %_____ FOREIGN %_____

4. WHAT IS THE AVERAGE LENGTH OF YOUR MESSAGES_____(EST OF LINES)

5. WHAT IS THE BASIC USE OR APPLICATION FOR YOUR TELEX/TWX

   _____

6. APPROXIMATELY HOW MANY OTHER TELEX OR TWX STATIONS DOES YOUR COMPANY HAVE INSTALLED IN THE US_____

7. DO YOU USE YOUR TELEX/TWX FOR ANY OTHER PURPOSES OTHER THAN MESSAGE TRAFFIC, AND IF SO, WHAT USES_____

   _____

8. IS THIS LOCATION YOUR COMPANY HEADQUATERS?

   HEADQUARTERS LOCATION_____

   _____

   _____

9. NAME OF INDIVIDUAL IN CHARGE OF COMMUNICATIONS AND TITLE

   _____TEL. NO._____

INPUT has been retained by a large firm in the information industry to examine for them the marketing prospects for a new message telecommunications service which they are considering building. This proposed service, which may be available within a year, will be able to provide many new and useful capabilities to the user of multi station message communications networks.

We have been asked to interview a number of message network users in order to provide user requirement information to our clients service design efforts. Your responses will be held confidential and will not be attributable to your company. Your responses will be part of a summary of user requirements.

1. How many Telex/TWX stations are installed within your company nationwide?

2. Could you provide us with a system map or list of communications locations?

3. What are the business functions performed at these locations; sales offices, warehouses, manufacturing plants, etc.

4. What are the major applications for which the Telex/TWX terminals are used?

5. What is the typical traffic volume for each application?

6. What is the traffic pattern for each application, e.g. sales office to order department and billing department.

7. Do these Telex/TWX stations send or receive much traffic outside of your company?

8. How much?

9. What are the primary applications for this outside traffic?

10. What is the relationship of these outside correspondents to your company? (e.g. customers, distributors, vendors)

11. Does your company have other message networks?

12. Describe this other message system(s).

13. System map or list of stations.

14. Why are some stations on Telex/TWX and some on these other networks?

15. Does your company have other data-com networks?

16. Describe this data-com network.

17. System map or list or stations.

18. Are there any interfaces between the Telex/TWX network and these other message and data networks?

19. Is this present interface situation satisfactory?

20. Why or why not?

21. Does your Telex/TWX network interface with any of your company's DP systems?

22. Describe this DP interface.

23. How is the decision made in your company to implement a new message communications network?

24. Are you satisfied with the performance of your existing Telex/TWX network?

25. Why or why not?

26. I am going to mention a number of aspects of a message network. Please tell me how satisfied you are with your Telex/TWX network in each of these aspects.

INP

	WELL SATISIFIED	ADEQUATE	INADEQUATE
Network Reliability	_____	_____	_____
Price	_____	_____	_____
Ease of Use	_____	_____	_____
Network Control	_____	_____	_____
Terminal Availability	_____	_____	_____
Value Added Features	_____	_____	_____

27. Have you made any substantial changes in recent years in your company's message networks? (number of stations, computer connection, higher speed network, etc.)

28. What was the primary motivation for such changes?

29. What has been the overall impact of these changes on your company's use of the Telex/TWX? (growth, applications, locations, terminals)

31. What terminals do you use on the Telex/TWX network?

31. Are these terminals satisfactory?

33. What improvements would you like to see in the terminals?

34. From whom do you obtain your Telex/TWX terminals?

35. Would you be interested or willing to obtain terminals from other vendors?

36. Approximately what is the total cost of your company's Telex/TWX network including useage, access and trerminal charges?

37. If you use other message networks, what is the total cost of these networks?

38. Are the user departments charged for the use of the Telex/TWX network?

39. Are the user departments charged for the use of the other message networks?

40. How?

41. What type of price structure of a message service would best meet your company's requirements? (fixed, useage sensitive, combination)

42. I am going to mention a number of network menagement tasks. Tell me how your company handles each of these in terms of who identifies the problem and who expedites the solution.

Station Outage_____

_____

_____

Invoice Reconciliation_____

_____

_____

New Station Installations_____

_____

_____

New Application Start-Ups_____

_____

_____

Network Optimization (traffic analysis, equipment upgrades)_____

_____

_____

43. Do you or your management regard the handling of these network management tasks as a problem?

44. What would you like to see from vendors with respect to the network management tasks?

45. What is the elapsed time between the origination or a Telex/TWX message and its delivery to the ultimate destination?

46. Would faster delivery be desireable? Why?

47. With how many other stations does a typical Telex/TWX station communicate on a regular basis.

48. What fraction of Telex/TWX messages are delivered to more than one addressee?

49. I am going to mention some value added features which could be useful to a message communications network. Tell me how useful you believe each of these features could be to your present Telex/TWX applications.

	VERY USEFUL	USEFUL	NOT USEFUL
Abbreviated Dialing	_____	_____	_____
Camp-on	_____	_____	_____
Multiple Address	_____	_____	_____
Group Codes	_____	_____	_____
Station Pulling	_____	_____	_____
Mailbox Delivery	_____	_____	_____

Auto. Service Upgrade	_____	_____	_____
High Speed Interface	_____	_____	_____
Other Service Interface	_____	_____	_____
T & C Call Billing	_____	_____	_____
Departmental Billing	_____	_____	_____
Message Formatting	_____	_____	_____

50. Of the value added features which you believed to be very useful how much more would you be willing to pay to obtain such features? Please express as either $/message or % additional.

51 Our client is considering the introduction of a new message communications service which would incorporate many of the value added features mentioned as well as being competitively priced with Telex/TWX. Would your company be interested in converting to such a service?

52. What would be your primary motivation for making such a conversion?

53. How important are the following considerations in your decision to convert or not convert to such a service?

	VERY IMPORTANT	IMPORTANT	NOT IMPORTANT
Price	_____	_____	_____
Ease of Use	_____	_____	_____
Network Reliability	_____	_____	_____
Network Management	_____	_____	_____
Value Added Features	_____	_____	_____
Geographic Coverage	_____	_____	_____

54. Would you convert your existing private message network to such a service?

55. What would be your primary motivation for making such a change in your private network?